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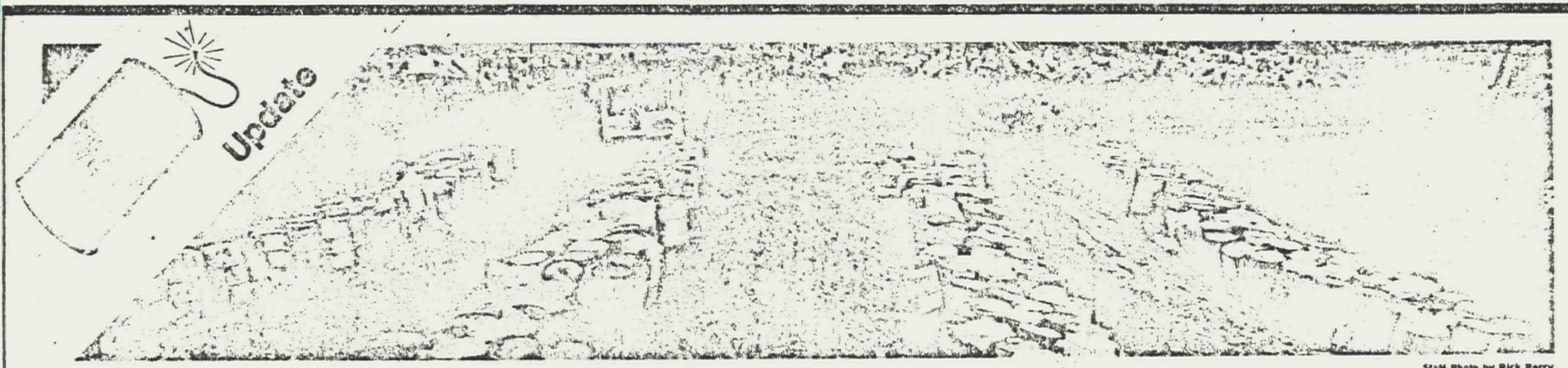

Staff Photo by Rick Perry

Workmen arranged drums according to content at the "valley of the drums."

What hazards are lurking in 'valley of the drums'?

Chemicals may be more dangerous than state has said

By JIM DETJEN and JIM ADAMS
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The chemicals that have been found at the "valley of the drums" in Bullitt County are used in everything from mothballs to embalming fluids, from mosquito repellents to polyester suits.

Some are exotic and toxic and have been outlawed. Others are used as the basic building blocks for the commercial culture in which we live.

With names such as bis (2-ethylhexyl) phthalate and dibromochloromethane, the chemicals that have been identified sound as if they belong in a laboratory — not in tiny Wilson Creek or in the muddy soils of rural Brooks, Ky. Yet, they have made the Bullitt site one of the nation's worst dumping grounds for industrial wastes, according to the U.S. Environmental Protection Agency.

A Courier-Journal study shows that the site may contain a larger number of hazardous chemicals than the state has indicated. The state Department for Natural Resources and Environmental Protection proposed a plan last week for disposal of most of the chemicals by incineration.

The study, including a look at 160 EPA soil and water samples from the "valley of the drums," shows that:

✔ Of the 65 chemicals listed by the EPA as priority pollutants — those water pollutants known to be among the most dangerous to the environment and health — 26 have been identified at the "valley of the drums."

✔ At least 11 of the chemicals identified are known to cause cancer in animals, and possibly humans. At least seven can bring about mutations in plants and animals. And at least six others are known to cause birth defects in animals, and possibly man.

✔ In all, more than 200 chemicals and metals have been identified so far by the EPA in water and soil samples taken from the illegal chemical dump in northern Bullitt County. Dozens of other chemical compounds have not been identified, and no one knows for sure what is inside the barrels themselves.

✔ Many of the chemicals appear to be tied to the paint industry, as state officials have maintained. They have said that many of the barrels contain dried paint, sludge and solvents. The state has also said that, of all the chemicals at the site, it is most concerned about two solvents — benzene and toluene. But the newspaper has found that some others also have hazardous potential — a danger the state has minimized.

✔ At least two of the chemicals identified at the site — PCBs (polychorinated biphenyls) and carbon tetrachloride — cannot be burned at an incinerator. Other chemicals at the site emit toxic phosgene gas when burned and should be incinerated only if careful precautions are taken.

How concerned should neighbors of the "valley of the drums" be about the hazards of these chemicals?

It is too early to tell. No one knows how dangerous the liquid wastes stored in more than 2,000 barrels at the site really are because chemical analyses have been done only of the contents of four barrels. While the soil and surface water at or near the site have been contaminated with a variety of chemicals, no drinking water supplies are contaminated, the EPA says.

More than 20,000 drums were dumped at the site at least between 1976 and 1978 by Arthur L. Taylor, the owner of the 24-acre sight 5 miles north of Shepherdsville. Taylor died last year.

Earlier this year, the EPA erected a treatment facility at the site to capture chemicals leaking into Wilson Creek, which passes through the property. The stream runs into Pond Creek in Jefferson County, which eventually empties into the Ohio River.

Health experts say at least a dozen chemicals found at the site are highly toxic. In large quantities, they can cause everything from kidney and liver damage to death. Several cause mental depression, intoxication and damage to the central nervous system. Others can cause eye damage, allergies, heart failure and comas.

Still others, such as PCBs, threaten the environment by contaminating the tissues of plants and animals where toxic residues build up. Toluene harms waterfowl. Methylene chloride smothers tiny organisms in lakes and streams.

Most of the chemicals that have been found in water and soil samples — 197 in all — were discovered in minute quantities. But that could indicate their presence in greater concentrations in the barrels themselves. Some

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Chemicals may be more dangerous than state has said

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would be of danger to public health only if discovered in much greater quantity than they are now known to exist at the site.

For several weeks, officials in the state Natural Resources Department denied newspaper requests to inspect laboratory analyses done in recent months of chemicals at the "valley of the drums." The department said it withheld the records because of a pending legal action against Nell Taylor, the widow of dump operator Taylor.

After a recent hearing on the Taylor case, the state released the analyses. The Courier-Journal was also able to obtain test records from the EPA in Atlanta after filing a formal request under the Freedom of Information Act.

However, although the EPA has conducted 620 analyses of 160 samples taken at or near the site, these tests have been only of the water and soil.

Nobody is really sure what is in the barrels that have not been tested, although officials believe most are the residues of the paint industries. At least five Louisville companies are known to have had their wastes dumped in the field.

"Just about everything we've found could have come from the manufacturers or users of paint," said E. W. Loy Jr., an analytical chemist with the EPA. "Xylene and toluene are commonly used solvents, and metals such as titanium are used in the manufacturing of white paint." Those materials are at the "valley of the drums."

But what about the presence of PCP (pentachlorophenol), a toxic chemical used to manufacture herbicides and wood preservatives? Or vinyl chloride, used to produce plastics and refrigerants?

"It's possible that even those chemicals may be used in small quantities in the manufacturing of paints or resins," Loy said. "Even PCBs were at one time used in the manufacturing of certain kinds of paint."

PCBs have been found in concentrations as high as 14,000 parts per billion at several locations at the "valley of the drums." Federal environmental officials say that concentrations of more than 3,000 parts per billion in the environment are "significant."

Eugene Mooney, state natural resources secretary, said his department has not yet determined where the PCBs — which cause skin lesions, liver ailments and possibly cancer in humans — may have come from.

To determine the potential hazards of the 197 chemicals and 28 metals found at the site, Courier-Journal reporters examined documents on file at the National Institute of Occupational Health and Safety in Cincinnati and at the Therapeutics and Toxicology Laboratory at the University of Louisville.

In addition, reporters used the Chemical Information Service computers at the National Institutes of Health in Bethesda, Md., to research many of the chemicals found at the "valley of the drums."

While state officials say they do not yet know for sure what is inside most of the barrels, they have proposed helping William Fluhr, a Jefferson County man, set up a chemical incinerator business at the site to dispose of the chemicals.

Many of the toxic chemicals discovered by the EPA can, indeed, be burned in a specially constructed chemical incinerator, according to information the newspaper gathered. But others — such as the PCBs Aroclor 1254 and 1260, and carbon tetrachloride — should not incinerated.

Under federal law, PCBs can be disposed of only in federally approved incinerators, and no incinerator in the country has yet received that approval. And according to the National Institutes of Health Chemical Information System, carbon tetrachloride should not be incinerated because it will give off dangerous fumes of hydrochloric acid when burned.

Other chemicals at the "valley of the drums" can also emit toxic fumes if burned. For example, when chloroform, methylene chloride and vinyl chloride are burned they emit phosgene gas — the same gas used by German troops in World War I to kill Allied forces through suffocation.

In recent days, state government officials have expressed confidence — and some confusion — about the capabilities of Fluhr's incinerator.

Fluhr bought the incinerator last year from Donald E. Distler, president of Kentucky Liquid Recycling Inc. (Distler was convicted in U.S. District Court in Louisville in connection with the dumping of toxic chemicals in Louisville's sewers in 1977.)

Mooney said at a news conference Thursday that "Mr. Fluhr's proposed incinerator would operate at or in excess of 2,000 degrees Centigrade" (about 3,600 degrees Fahrenheit) and would be "a much more sophisticated operation than any one we have already in the state."

However, Indiana state health officials say their records show that the same incinerator — when Distler sought to operate it in New Albany, Ind., in 1976 — was able to burn chemicals at between 1,600 and 2,000 degrees Fahrenheit.

Gary Metcalf, chief of the fuel combustion and refuse disposal section of Kentucky's Division of Air Pollution, disagreed with Mooney's contention, saying, "I am sure the (Fluhr) unit would not be capable of burning at 2,000 degrees Centigrade."

Metcalf said his section has inspected documents about Fluhr's incinerator and believes it can burn at 1,200 degrees Centigrade (about 2,200 degrees Fahrenheit) — hot enough to burn some very toxic chemicals under proposed federal regulations.

He said his office will monitor air emissions from Fluhr's incinerator.

"There will be some allowable emission of toxic material, but our standards will be quite conservative in my opinion," Metcalf said.

Mooney has said that any toxic chemicals that Fluhr cannot burn must be taken out of the state for proper disposal.

Many of the chemicals can cause cancer, mutations and other ill effects.

For example, benzene is suspected of causing cancer in man, and studies of workers at the B. F. Goodrich Co. in Louisville have shown that exposure to vinyl chloride can cause liver cancer. Other chemicals at the site known to cause cancer in laboratory animals include anthracene, carbon tetrachloride, chloroform, methylene chloride, PCB, phenanthrene, phenol, pyrene and trichloroethylene.

Among those capable of causing birth defects in animals — and possibly humans — are benzene, bis (2-ethylhexyl) phthalate, carbon tetrachloride, dibutyl phthalate, methyl ethyl ketone, PCP and tetrachloroethene.

And scientific studies have found that chemicals at the site capable of causing mutations are benzene, bis (2-ethylhexyl) phthalate, bromoform, chlorodibromomethane, chloroform, PCP, tetrachloroethene and vinyl chloride.

In addition, at least 12 chemicals at the site are considered to be highly toxic by the 1979 version of N. Irving Sax's book "Dangerous Properties of Industrial Materials." State environmental officials consider that volume their "Bible" on toxic chemicals.

High toxicity means a chemical is capable of causing "death or permanent injury due to the exposures of normal use" or is "incapacitating and poisonous."

Among those chemicals that are highly toxic depending on how they enter the body are: benzoic acid, carbon tetrachloride, decanoic acid, dodecanoic acid, heptanoic acid, isobutyl methyl ketone, octadecanoic acid, pentanoic acid, phenol, quinoline and vinyl chloride.

Many of the other chemicals at the site are known to have a variety of toxic effects in animals and humans. For example, phenol — which has been found at concentrations as high as 1,500 parts per billion — can damage organs and the central nervous system and lead to paralysis and death.

According to Sax, spilling a solution of phenol on the skin can kill a person within 30 minutes to several hours.

Nobody knows how much — if any — phenol is stored in barrels at the "valley of the drums," but the chemical has been found in four water samples taken on or near the site.

A layman's guide to our chemical 'garbage'

From acetone to xylene, a look at 21 of the 200 chemicals that make the "valley of the drums" an environmental nightmare. The chart profiles the chemicals that are the most hazardous to man or were present in large quantities in samples taken by EPA.

Chemical	Highest concentration found	Uses	Health hazards	Other hazards
Acetone	9,300 parts per billion (ppb)	Solvent for fats, oils, waxes, resins, rubber, plastics, varnishes.	Moderately toxic when breathed or eaten. May cause headaches, fatigue and unconsciousness if high levels are inhaled.	Flammable
*Aroclor 1254 + 1260 (PCB)	14,000 ppb	Electrical transformers	Skin lesions, liver damage. Builds up in body tissue. Causes cancer in mice. Moderately toxic.	Slight fire hazard. Emits highly toxic fumes when burned. Disposal requires burning at very high temperatures.
*Benzene	Trace amounts	Solvents for waxes, oils. Varnishes. Lacquers. DDT. Linoleum. Dyes and many other organic chemicals.	Breathing high levels may cause acute poisoning, death. Suspected of causing cancer in man. Known to cause cancer, mutations, and birth defects in animals.	Very flammable. High air pollution hazard. Moderately explosive.
*Bis (2-ethylhexyl) phthalate	120,000 ppb	Vacuum pumps; plasticizer; vinyl resins.	Low to zero toxicity. Causes mutations in mice, birth defects in rats.	Slight fire hazard. Can be burned in chemical incinerator.
*Butyl benzyl phthalate	1-10,000 ppb	Plasticizer.	Toxicity unknown. May emit irritating vapors at high temperatures.	Slight fire hazard. Can be burned in chemical incinerator.
Camphor	230 ppb	Lacquers and varnishes; insect repellent; incense; embalming fluid; plasticizer; pharmaceuticals.	Moderate toxicity. Can cause vomiting, dizziness, convulsions, death.	Moderate fire hazard. Vapor explodes when exposed to flame.
Carbon Tetrachloride	Trace amounts	In fire extinguishers; as solvent for oils, varnishes, resins; cleansers; many organic chemicals.	Causes cancer and birth defects in mice. Suspected of causing cancer in man. Highly toxic.	Emits toxic phosgene gas if burned. Should not be incinerated.
*Chloroform	Trace amounts	Solvent for fats, rubber, waxes, resins; cleaning agent; refrigerants.	Moderately toxic if swallowed or inhaled. Chronic exposure can damage liver and kidneys. Causes cancer in animals and mutations in plants. Prolonged inhalation can cause paralysis, death.	Slight fire hazard. When burned, emits toxic phosgene gas.
*Dibutyl phthalate	1-10,000 ppb	Insect repellant on clothing; explosives; plasticizer.	Thought to be relatively harmless. Possible nervous system disorders if swallowed. Causes birth defects in rats.	Slight fire hazard. May be burned in a chemical incinerator, or buried in special landfill.
*Isophorone	500 ppb	Solvents	Highly toxic if eaten or inhaled. Can damage cornea of eye and harm kidneys.	Moderate fire hazard. Toxic air pollutant. Can harm waterfowl.
Methylene Chloride	140 ppb	Degreasing and cleaning fluids; solvents; as a pain killer.	Moderately toxic. Causes cancer in animals. Very dangerous to the eyes. Inhalation can cause nausea, vomiting.	Emits toxic phosgene gas if burned. Can harm wildlife.
Methyl ethyl ketone	6,300 ppb	Solvent; cements and adhesives; cleaning fluids.	Moderately toxic if swallowed. Affects nervous system. Causes birth defects in animals.	Dangerous fire hazard, very hazardous if exposed to flame.
*Naphthalene	11,000 ppb	Insecticides. Moth repellent. Resins.	Moderately toxic. May cause nausea, fever, vomiting, anemia and coma.	Moderately flammable. Vapors are explosive. May be incinerated.
*Pentachlorophenol (PCP)	4.3 ppb	Wood preservative. Fungicide. Herbicide. Defoliant.	Highly toxic. Causes tumors and birth defects in animals. Causes mutations in plants. Causes lung, liver and kidney damage and may cause death.	Emits highly toxic fumes if burned. Builds up in body tissues.
*Phenol	1,500 ppb	Disinfectants, dyes, resins.	Highly toxic if swallowed, inhaled or absorbed through skin. Can damage central nervous system, various organs. Swallowing as little as 1.5 grams has killed. Causes cancer in animals.	Moderate fire hazard. Emits toxic fumes when burned. Can be burned in some incinerators for disposal.
Quinoline	9.6 ppb	Drugs. Dyes. Varnishes. Paints.	Highly toxic if swallowed or inhaled. May harm retina of eye.	Emits toxic fumes if burned. May harm aquatic life. Slight fire hazard. Can be incinerated.
Tetrachloroethene	18 ppb	Dry cleaning solvent; degreasing.	Moderately toxic if breathed or swallowed. Headaches, nausea, vomiting.	Burns only at high temperatures, but hightly toxic products created when burned.
*Toluene	340 ppb	Solvents. Dyes. Explosives.	Moderately toxic if swallowed or inhaled.	Emits toxic fumes if burned. Slight fire hazard. Can harm waterfowl. May be incinerated.
Trichloroethylene	22 ppb	Dry cleaning, degreasers.	Moderately toxic. Chronic exposure can damage liver, other organs. Causes cancer in animals. Permitted as food additive for human consumption.	Low fire hazard. Emits toxic fumes if burned.
*Vinyl Chloride	Trace amounts at several locations.	Plastics. Refrigerants. Consumer products.	Causes cancer in animals and humans. Causes liver and bone damage, circulatory disorders, lesions.	Dangerous fire hazard. Severe explosion hazard. Emits toxic phosgene gas if burned.
Xylene	330,000 ppb	Solvents. Dyes. Polyester fibers. Cleaning agents.	Moderately toxic if swallowed or inhaled. Mild irritant to skin.	Dangerous fire hazard. Can be explosive. Can harm waterfowl and crops. Breaks down in the environment slowly. Can be incinerated.

*On the EPA list of 65 "priority pollutants," those water pollutants known to be among the most dangerous to the environment and health.

Sources of information: U.S. Environmental Protection Agency water and soil analyses; The National Institutes of Health/EPA Chemical Information System; "Dangerous Properties of Industrial Materials," by N. Irving Sax, Fifth Edition, 1979; proposed federal water-quality criteria published in the Federal Register on March 15, 1979; Therapeutics and Toxicology Laboratory, University of Louisville School of Medicine; The Merck Index, 1979; Handbook of Environmental Data on Organic Chemicals, by Karl Verschueren, 1977; Summary Report: Drinking Water and Health, by the National Academy of Sciences, 1977.

Staff Chart